number of images situated on three straight lines at right angles to one another, and intersecting at the bright point.

These mirrors are also inclined to one another at right angles. Let $A^\circ=\frac{\pi}{2}=$the angle of inclination of the mirrors, a°, b° the angles made by the candle with two of the mirrors.

Then $\frac{360^\circ-(a^\circ+b^\circ)}{A^\circ}=\frac{360^\circ-90^\circ}{90^\circ}=3=$the number of images due to two of the mirrors inclined at 90°. There are twelve such sets of inclined mirrors, but of the 36 images formed, 18 are repeated. $\therefore$ $\frac{1}{2}$ of 12 of $3=18$ images due to the inclined mirrors.

$\therefore$ $\frac{12\{2\pi-(a^\circ+b^\circ)\}}{\pi}$, is the formula for the images due to the inclined mirrors, where $a^\circ+b^\circ=\frac{\pi}{2}$.

30. **Proposed by R. J. ADCOCK, Larchland, Warren County, Illinois.**

When the sum of the distances of a point of a plane surface, from all the other points, is a minimum, that point is the center of gravity of the plane surface.

I. **Proof by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Applied Science, Texarkana College, Texarkana, Arkansas-Texas.**

Let (x_1, y_1) be the point, (x, y) any other point, S the sum of the distances of (x, y) from (x_1, y_1).

$$\text{Then } S=\int_{x_1}^{x_2}\int_{y_1}^{y_2}\sqrt{(x-x_1)^2+(y-y_1)^2}\,dxdy.$$

Let $\int_{x_1}^{x_2}\int_{y_1}^{y_2}$ be represented by $\int$, and $dxdy$ by dA.

$$\therefore S=\int\sqrt{(x-x_1)^2+(y-y_1)^2}\,dA=\int D\,dA.$$

$$\text{For a minimum, }\frac{dS}{dx_1}=\frac{(x-x_1)dA}{D}=0,\ \frac{dS}{dy_1}=\frac{(y-y_1)dA}{D}=0.$$

$$\therefore (x-x_1)dA=0,\ (y-y_1)dA=0.\quad \therefore x_1=\frac{\int xdA}{\int dA},\ y_1=\frac{\int ydA}{\int dA}.$$

$$\therefore x_1=\frac{\int\int xdxdy}{\int\int dxdy},\ y_1=\frac{\int\int ydxdy}{\int\int dxdy}.$$

II. **Remark by S. H. WRIGHT, M. D., M. A., Ph. D., Penn Yan, New York.**

Mr. Adcock's problem asserts the truth evidently, when regular plane surfaces are considered, such as the square, rectangle, parallelogram, rhombus, the circle, and *equilateral polygons*. I hardly believe the problem will apply to *any irregular* figure.

III. **Comment, etc., by O. W. ANTHONY, M. Sc., Professor of Mathematics in New Windsor College, New Windsor, Maryland.**

It is evidently meant that when the sum of the squares of the distances of a point from all other points is a minimum the point is the *c. g.* of the surface. It can easily be proved that the other is not true.

[If Prof. Anthony will furnish a proof that the proposition does not hold for *any or all figures* we will be glad to publish it. We append Prof. Anthony's proof of the well-known proposition which he quotes. EDITOR.]

[The sum of the squares of the distances of a point (h, k) from all other points in the surface is $u=\int\int\left[(x-h)^2+(y-k)^2\right]dxdy$, where the integration is over the entire surface. For minimum, $\frac{du}{dh}=0$, $\frac{du}{dk}=0$. i.e.,

$$\int\int(x-h)dxdy=0, \text{ and} \int\int(y-k)dxdy=0;$$

$$\text{Whence } h=\frac{\int\int xdxdy}{\int\int dxdy}, \text{ and } k=\frac{\int\int ydxdy}{\int\int dxdy}.$$

That is (h, k) is the center of gravity of the surface.]

NOTE. In Prof. Ross' problem in September-October No., p. 291, read "*square* field ABC" instead of "*rectangular* field;" also insert "irregular" before the second "plane curve" in line 2 of Prof. Taylor's problem, and read "distance" for "distances" and $(C)=h$ for $(C=h)$ in line 5 of same problem.

PROBLEMS.

35. **Proposed by WILLIAM SYMMONDS, A. M., Professor of Mathematics and Astronomy in Pacific College, Santa Rosa, California; P. O., Sebastopol, California.**

To an observer whose latitude is 40 degrees north, what is the sidereal time when Fomalhout and Antares have the same altitude: taking the Right Ascension and Declination of the former to be 22 hours, 52 minutes, —30 degrees, 12 minutes; of the latter 16 hours, 23 minutes, —26 degrees, 12 minutes?

36. **Proposed by J. K. ELLWOOD, A. M., Principal of the Colfax School, Pittsburg, Pennsylvania.**

"What is the length of a chord cutting off one-fifth of the area of a circle whose diameter is 10 feet?"

37. **Proposed by F. M. SHIELDS, Coopwood, Mississippi.**

A gentleman owned and lived in the center, R, of a rectangular tract of land whose diagonal, D, 350 rods, dividing the tract into two equal right-angled triangles, in each of which is inscribed the largest square field, F and F, possible; the north and south boundary lines of the two square fields being extended and joined formed a little rectangular lot,